distinguished by the presence of well-developed dicotyledonous leaves"; and further on these are said to occur at "the very base" of the formation. Now though such statements are sometimes loosely made, it should be understood that American geologists generally acknowledge that the base of their Cretaceous is, in some localities at least, only equivalent to the base of the Upper Cretaceous of Europe. In Canada, at least, the strictly Mesozoic flora of the Lower Cretaceous has been clearly distinguished from the angiospermous flora of the middle and upper parts of the series.

The oldest Cretaceous beds known in Canada are, I believe, those of the Queen Charlotte Islands, referred by Mr. Whiteaves, on the evidence of animal fossils, to the Neocomian age. The flora of these, consisting of cycads and conifers only, without any trace of dicotyledonous leaves, was described by me in the Report of the Geological Survey for 1873, and I remarked at the time on its decidedly Mesozoic aspect. It will be seen by reference to my memoir on the Cretaceous floras of British Columbia and the North-West Territories, in the *Transactions* of the Royal Society of Canada for 1883, that the oldest angiospermous flora known at that time in Western America is that of the Dakota group, described by Lesquereux and supposed to be of Cenomanian age. We have not yet found any dicotyledonous leaves quite so old in Canada. Our oldest angiospermous flora occurs in beds referred by Dr. G. M. Dawson and Mr. Whiteaves to the Niobrara group, which is approximately of the age of the Chalk Marl of England, in so far as can be judged by its animal fossils. A detailed table of the beds is given in the memoir above referred to, and the facts are stated in general terms in the "Descriptive Sketch" of the geology of Canada which was distributed to the members of the British Association (p. 51).

It will thus be seen that, though our angiospermous flora may possibly have appeared somewhat earlier than that of Europe, the discrepancy is by no means so great as stated in the abstract referred to. The correct statement would be, in so far as Canada and the western parts of the United States are concerned, that the oldest angiosperms known in America are probably of Cenomanian age, and that the older Cretaceous contains only, so far as known, a flora of Mesozic character. Concerning the limits of the Cretaceous and the Eocene on the one hand, and the limits of the Cretaceous and Jurassic on the other, there are no doubt some unsettled questions; but these do not affect the facts above stated. J. WM. DAWSON

Montreal, October 9

SIR J. W. DAWSON'S correction only applies to the published abstract of my paper. The editor of the *Geological Magazine* having kindly offered to publish the full text, it will be seen that its scope was limited to Cretaceous dicotyledonous floras, and the older ones, to which Sir John calls attention, were purposely excluded. The title "Cretaceo-Eocene" was intended to imply that the subject was the border-land of these two formations; but I am greatly obliged for the note and the copy of the work which accompanied it. J. S. G.

Palæolithic Implements from Cambridge

ONLY two implements of Palæolithic age have been recorded from the neighbourhood of Cambridge. One of these is a rude form picked off a heap of gravel near the Observatory, and the other was bought from some workmen, and was said by them to have come from the Barnwell gravel. There is therefore considerable interest attached to the discovery of an implement of this age on the plateau between Upper Hare Park and the Cambridge Newmarket Road. This plateau is part of one of the old river terraces which formerly abutted against the hills on the east, but is now cut off from them by the valley along which the railroad to Newmarket runs. It belongs to an earlier period than that of the Barnwell gravel.

Further to the south, near Lark's Hall, in gravels which probably belong to the same set of river terraces, remains of rhinoceros, &c., have been found, but hitherto no implements or other traces of the existence of Palæolithic man have been brought to light in that district.

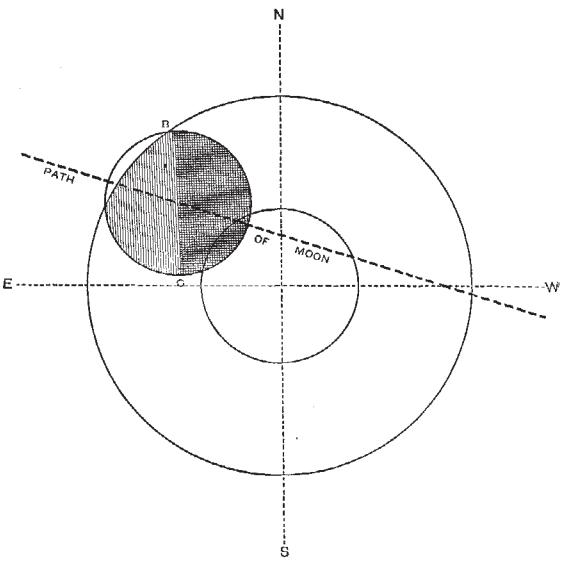
The plateau near Upper Hare Park is all unfenced arable land, and the implement which I found buried in the surface soil with only a small part of its thicker end visible, had probably been turned up out of the gravel by the plough, its surface having the same general appearance as the flints derived from the gravel. It is of the tongue-shaped St. Acheul type, and has a fine patinated surface. It measures $5\frac{1}{2}$ inches in length, 3 inches across its broadest part, and nearly $1\frac{1}{2}$ at its thickest. One end is rounded so as to be easy to hold in the hand, and from this it tapers gradually with a sharp cutting edge to the point. On each side of the implement the edge is curiously rough and shattered, owing to the original quality of the flint and the way in which the flakes broke off when it was being made.

Not very far from the spot where it was found, skirting the carriage-drive which leads up to the house, are several small hollows from which level has most likely been dug. In these hollows and all round their margin the ground is covered with flints belonging to the gravel, and amongst them I found quantities of flint chips, one or two very nicely-dressed flakes, and several scrapers.

Similar dressed flakes and scrapers are found in the caves of the South of France associated with implements of Palæolithic age; but in the case of those found near Upper Hare Park there is not sufficient evidence to prove whether they belong to the period of the gravel or were manufactured on its surface at some later period. M. C. HUGHES

The Recent Lunar Eclipse

I WONDER whether any of the readers of NATURE who were witnesses to the almost total annihilation of the moon on Saturday night, October 4, noticed a rather strange peculiarity which was visible at about 10.50 p.m., both before and after second internal contact with shadow. When the peculiarity first appeared I cannot myself say, but I noticed it first at 10.43 when I went out to look for the almost invisible moon with the aid of a good opera-glass. In the accompanying diagram, which I have constructed from the data given in the almanacs, the moon is represented as just having emerged slightly from the shadow at 10.50 or so, when the peculiarity showed very distinctly, the moon having the appearance which is roughly represented



in the diagram, being apparently divided into two halves by a tolerably distinct line of demarcation (*bc*) running north and south (or towards the celestial pole), the right hand or westerly half appearing much darker than the left or easterly half. It is evident that an appearance like this, so striking when once noticed, could be produced in two ways, first, by the western hemisphere of the moon being actually darker than the left or eastern half; in which case the moon would have exhibited this appearance more or less throughout totality; but it did not, as I noticed nothing of the sort at 10.15, when looking through the same glasses, so that the second explanation must be resorted to. In the diagram the larger outer circle represents the border of the earth's shadow (in the case of this eclipse about 5750 miles in diameter) which is cast by the earth, irrespective of its atmosphere. The inner circle represents the border of an inner and darker shadow of the earth, cast by those of the sun's

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rays which succeed in being refracted or bent round through our atmosphere (the amount of bending of the light extending to a maximum of about 70′ in the lowest strata of the atmosphere). Into this inner circle, in this case about 2525 miles in diameter at the distance of the moon, no rays of light can stray except those which are *scattered* by our atmosphere as a sun-illumined envelope. It is now very evident that the position of the dark patch bordered by the line (*b–c*) and lying partly over the western half of the moon, with respect to the earth's shadow, is very anomalous. If the line (*bc*) had been curved concentrically to the centre of the shadow, it would have been less surprising. The only way in which it can be accounted for is by supposing the earth's atmosphere to have been very opaque about the regions of the earth within the Arctic circle, allowing very little light, if any, to be refracted, and, tracing southwards that meridian along which the moon would be setting at the time, the atmosphere getting clearer and clearer, first in the upper strata and then in the lowest as we go southwards, until the equator is nearly reached. At 10.50 the moon would be illuminated by solar rays refracted by the earth's atmosphere and tangential to the earth's surface along the meridian 105° east of Greenwich (or thereabouts), which passes through Irkutsk (in Siberia), Mongolia, Tonquin, and Siam, along which line the inhabitants would see the moon going down inveiled in its mysterious obscurity. It would be interesting to know whether any observers noticed, at about the middle of the eclipse, any contrast between the inner and darker shadow, in which the moon would be largely immersed, and the outer regions of the shadow which are illuminated dimly by both refracted and scattered light. The unusual darkness of this eclipse, surprising, as it must have done, all spectators, must be taken as a strong indication of great opacity in our atmosphere. Another noticeable feature was the unsymmetrical appearance of the illuminated crescent at 10.50, when the northern cusp (*b*) exhibited a bluish-white, shading off gradually from the brilliant white to the obscurity of the shadow, while the other cusp seemed quite sharp and distinct. Observing the eclipse both with the naked eye and through a 4½″ equatorial, neither my fellow observers nor myself noticed any other indication of a blue fringe than that appearing just at *b*, which seemed to me therefore to be a real appearance, and not a subjective effect of contrast, as there was not complementary copper colour anywhere on the moon sufficiently strong to suggest the blue, and if there had been I ought to have noticed the blue fringe all along the edge of the shadow bordering on the crescent, but it appeared to me of a neutral grey.

Heworth Green, York H. DENNIS TAYLOR

The Red Light round the Sun—The Sun Blue or Green at Setting

I CAN confirm Mr. Backhouse's and Mr. E. D. Archibald's impression about the colour now and for some time past seen round the sun; that it first appeared about November last and has been more or less visible ever since. The colour was then, and still is, sometimes rose, sometimes amber or buff. It is best observed, when the sun on bright days is behind a cloud, round that cloud, in the place where, at other times, broken beams of shadow, thrown out from the cloud like a row of irregular palings and deepening the blue of the sky, are to be seen. Towards sunset it becomes glaring, and white and sallow in hue. Something of a circular shape may then perhaps be made out in it, but it does not seem to me that it ought to be called a halo. A halo, as I understand, is a ring, or at least a round space inclosed by a ring. This appearance has no ring round it. Also in a halo (I have seen numbers) it is the ring that is coloured—either throughout, or at four places where the ends of the four arms of a cross would rest upon it; and the inclosed field is uncoloured or coloured like the rest of the sky: here there is an uninclosed but singularly-coloured field.

But whether we call the appearance a halo or not is perhaps only a question of terms: to call it a corona, as Mr. Leslie does, is another, and, as it seems to me, a hazardous thing, because it would imply that what we are looking at is an appendage of the sun's own (and that too at a time when it is strongly doubted if the sun has a corona of any sort of all), instead of what is much easier to suppose, a terrestrial or atmospheric effect. If there is going on, as Mr. Leslie thinks, an "increase of sun power," this ought to be both felt and measured by exact instruments, not by the untrustworthy impressions of the eye. Now Prof. Piazzi-Smyth says that sunlight, as tested by the spectroscope, is weaker, not stronger, since the phenomena of last winter began. To set down variations in light and heat to changes in the sun when they may be explained by changes in our atmosphere, is like preferring the Ptolemaic to the Copernican system.

It is, however, right and important to distinguish phenomena really new from old ones first observed under new circumstances which make people unusually observant. A sun seen as green or blue for hours together is a phenomenon only witnessed after the late Krakatoa eruptions (barring some rare reports of like appearances after like outbreaks, and under other exceptional conditions); but a sun which turns green or blue just at setting is, I believe, an old and, we may say, ordinary one, little remarked till lately. I have a note of witnessing it, with other persons of a company, in North Wales on June 23, 1877, the sunset being very clear and bright. It is, possibly, an optical effect only, due to a reaction (from the red or yellow sunset light, to its complementary colour) taking place in the over-strained eye at the moment when the light is suddenly cut off, either by the sun's disappearance or by his entering a much thicker belt of vapour, which, foreshortened as the vapour is close to the horizon, may happen almost instantaneously. And this is confirmed by a kindred phenomenon of sunset. If a very clear, unclouded sun is then gazed at, it often appears not convex, but hollow; swimming—like looking down into a boiling pot or a swinging pail, or into a bowl of quicksilver shaken; and of a lustrous but indistinct blue. The sky about it appears to swell up all round into a lip or brim, and this brim is coloured pink. The colour of the light will at that time be (though the eye becomes deadened to it) between red and yellow. Now it may be noticed that when a candle-flame is looked at through coloured glass, though everything else behind the glass is strongly stained with the colour, the flame is often nearly white: I suppose the light direct from the sun's disk not only to master the red and yellow of the vapour medium, but even, to the eye, to take on something of the complementary blue.

Even since writing the above I have witnessed, though slightly, the phenomenon of a blue setting. The sunset was bright this evening, the sun of a ruddy gold, which colour it kept till nothing was left of it but a star-like spot; then this spot turned, for the twinkling of an eye, a leaden or watery blue, and vanished.

There followed a glow as bright almost as those of last year. Between 6.15 and 6.30 (Dublin time) it was intense: bronzy near the earth; above like peach, or of the blush colour on ripe hazels. It drew away southwards. It would seem as if the volcanic "wrack" had become a satellite to the earth, like Saturn's rings, and was subject to phases, of which we are now witnessing a vivid one. G. M. H.

Dublin, October 19

The Volcanic Dust (?) Phenomena

THE changeableness of the wisps of this dust (?) is surprising. On the 19th inst., near sunset, they were conspicuously visible in all parts of the great corona round the sun, being definite in form—narrow, and about 5° long; it was the first time I had seen them since (I believe) May 18, when they were only just perceptible. During the intervening period the film or portion of the atmosphere on which the universal sky phenomena have appeared has been perfectly uniform in texture. On the 20th inst. they were again conspicuous about sunset, extending faintly even beyond the great corona; they appeared horizontal in the north-west. They were more or less visible about the same time on the 23rd and 26th, on which latter date they could be distinguished faintly in the semicircle opposite the sun at 7.30 a.m. and 4.8 p.m.

It would be interesting to know how far the changes in their visibility are simultaneous over large districts: it appears that they are not universal, for Mr. R. Leslie (NATURE, October 16, p. 583) describes them as distinct though very small in the early part of July this year, at which period I never perceived a trace of them in Switzerland. I take the "cloud forms" Mr. Leslie describes to have been the same I am alluding to, though the colour seems to have then been too faint to be perceptible at Southampton. I cannot attempt to explain how the glare round the sun was visible to him in 1882 or earlier, when the red part of what seems to be the same phenomenon did not appear till so long after.

Observations on the motion of the wisps would be very useful in showing the movements of the upper currents of the atmosphere. I have made a few, but they are not very satisfactory.

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